

UNITED STATES PATENT APPLICATION FOR

**SECURE SERVER-BASED IDENTIFICATION FOR
SIMPLIFIED ONLINE TRANSACTION PROCESSING
WITH PALMTOP COMPUTER**

Inventor

Greg Arnold

Prepared by:

**WAGNER, MURABITO & HAO LLP
TWO NORTH MARKET STREET
THIRD FLOOR
SAN JOSE, CALIFORNIA 95113
(408) 938-9060**

5

FIELD OF THE INVENTION

10 The present invention relates to the field of transaction processing using a
palmtop computer.

BACKGROUND

15

As the components required to build a computer system have reduced in size, new categories of computer systems have emerged. One of the new categories of computer systems is the "palmtop" computer system. A palmtop computer system is a computer that is small enough to be held in the hand of a user and can be "palm-sized." Most palmtop computer systems are used to implement various Personal Information Management (PIM) applications such as an address book, a daily organizer and electronic notepads, to name a few.

Due to the small size of such palmtop computers, they are convenient to carry in a pocket or purse. Unfortunately, they are also easily lost or stolen due to their small size. As such, it is generally undesirable to store sensitive information such as credit or debit card numbers in such a device. With the latest generation of palmtop computers, which include an internal RF transceiver, a user is able carry out many types of online transactions from almost anywhere. Such transactions typically require the user to enter substantial amounts of

094736-0310

information such as name, address and credit card number. Unfortunately, the small size makes even the best data entry schemes somewhat tedious and error prone. Therefore, it would be useful to provide a way to utilize storage outside the palmtop computer to store sensitive information, while still permitting quick
5 access to that information to facilitate transaction processing.

SUMMARY OF THE INVENTION

10 Accordingly, what is needed is a method and apparatus for secure transaction processing which can be utilized with a palmtop computer, but which utilizes storage facilities of a remote server. A method and system are described for providing such method and apparatus.

15 In certain embodiments of the invention, a secure simplified transaction processing method and apparatus for a palmtop computer is disclosed. Sensitive personal information is stored in a secure personal information database. A site map database contains information which maps the fields of the personal information database to frames of a Web page. On request of a
20 palmtop computer, a robot program correlates the personal information fields with the frames of the Web page and sends the personal information back to the palmtop computer. The palmtop computer uses this information to automatically populate the frames of a Web clipping representing a Web page. This has the advantage that the user does not have to manually fill in the frames of the web
25 clipping while providing security for sensitive information.

In accordance with a method of certain embodiments of the invention, a method for providing transaction processing in a palmtop computer, is implemented by: providing a file server; providing a personal information
30 database, residing on the file server, containing personal information data

5

15

20

the palmtop computer to a file server to obtain information to populate a plurality

of frames of a selected Web clipping. A radio receiver receives a transmission from the file server containing personal information data extracted from a personal information database, the personal information database residing on the file server, and containing personal information data relating to a user of the
5 palmtop computer. A processor populates the frames of the selected Web clipping with the personal information data received.

BRIEF DESCRIPTION OF THE DRAWINGS

10

Figure 1 is system illustration of a palmtop computer system connected to other computer systems and the Internet via a cradle device.

15

Figure 2A is a top side perspective view of a palmtop computer system that can be used in the present invention.

Figure 2B is a bottom side perspective view of the palmtop computer system of Figure 2A.

20

Figure 3 is an exploded view of the components of the palmtop computer system of Figure 2A.

25

Figure 4 is a perspective view of a cradle device for connecting the palmtop computer system to other systems via a communication interface.

Figure 5 is a logical block diagram of the palmtop computer system in accordance with an embodiment of the present invention.

Figure 6 is a block diagram of the major components of a wireless network in accordance with an embodiment of the present invention.

5 Figure 7 is a diagram illustrating the information flow in an embodiment of the present invention.

Figure 8 is a flow chart describing operation of the present invention in certain embodiments.

10

DETAILED DESCRIPTION OF THE INVENTION

15 In the following detailed description of the present invention, a secure transaction processing arrangement for use with a palmtop computer, numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will be recognized by one skilled in the art that the present invention may be practiced without these specific details or with equivalents thereof. In other instances, well known methods, procedures, components, and circuits have not been described in detail as not to
20 unnecessarily obscure aspects of the present invention.

NOTATION AND NOMENCLATURE

25 Some portions of the detailed descriptions that follow are presented in terms of procedures, steps, logic blocks, processing, and other symbolic representations of operations on data bits that can be performed in computer memory. These descriptions and representations are the means used by those skilled in the data processing arts to most effectively convey the substance of their work to others skilled in the art. A procedure, computer executed step, logic
30 block, process, etc., is here, and generally, conceived to be a self-consistent sequence of steps or instructions leading to a desired result. The steps are

those requiring physical manipulations of physical quantities. Usually, though not necessarily, these quantities take the form of electrical or magnetic signals capable of being stored, transferred, combined, compared, and otherwise manipulated in a computer system. It has proven convenient at times, principally
5 for reasons of common usage, to refer to these signals as bits, values, elements, symbols, characters, terms, numbers, or the like.

It should be borne in mind, however, that all of these and similar terms are to be associated with the appropriate physical quantities and are merely
10 convenient labels applied to these quantities. Unless specifically stated otherwise, as apparent from the following discussions, it is appreciated that throughout the present invention, discussions utilizing terms such as "processing" or "computing" or "translating" or "calculating" or "determining" or "scrolling" or "displaying" or "recognizing" or the like, refer to the action and
15 processes of a computer system, or similar electronic computing device, that manipulates and transforms data represented as physical (electronic) quantities within the computer system's registers and memories into other data similarly represented as physical quantities within the computer system memories or registers or other such information storage, transmission or display devices.

20 For clarity, the term "field" as used herein with reference to a field in a database is intended to have the conventionally accepted meaning in the database arts. The term "frame", as used herein, is intended to embrace database fields as represented by data entry boxes in a Web page form or a
25 Web clipping form.

**SECURE SERVER-BASED IDENTIFICATION FOR SIMPLIFIED ONLINE
TRANSACTION PROCESSING WITH PALMTOP COMPUTER IN
ACCORDANCE WITH THE PRESENT INVENTION**

5 While this invention is susceptible of embodiment in many different forms,
there is shown in the drawings and will herein be described in detail, specific
embodiments, with the understanding that the present disclosure is to be
considered as an example of the principles of the invention and not intended to
limit the invention to the specific embodiments shown and described. In the
10 description below, like reference numerals are used to describe the same, similar
or corresponding parts in the several views of the drawing.

Figure 1 illustrates a system 50 that can be used in conjunction with the
secure transaction system and method of the present invention. System 50
15 comprises a host computer system 56 which can either be a desktop unit as
shown, or, alternatively, can be a laptop or notebook computer system 58.
Optionally, one or more host computer systems can be used within system 50.
Host computer systems 58 and 56 are shown connected to a communication bus
54, which in one embodiment can be a serial communication bus, but could be of
20 any of a number of well known designs, e.g., a parallel bus, Ethernet Local Area
Network (LAN), etc. Optionally, bus 54 can provide communication with the
Internet 52 using a number of well known protocols.

Bus 54 is also coupled to a cradle 60 for receiving and initiating
25 communication with a palmtop ("palm-sized") portable computer system 100 of
the present invention. Cradle 60 provides an electrical and mechanical
communication interface between bus 54 (and anything coupled to bus 54) and
the computer system 100 for two-way communications. Computer system 100
may contain a wireless infrared communication mechanism 64 for sending and
30 receiving information to and from other devices.

Figure 2A is a perspective illustration of the top face 100a of one embodiment of the palmtop computer system of the present invention. The top face 100a contains a display screen 105 surrounded by a bezel or cover. A removable stylus 80 is also shown. The display screen 105 is a touch screen able to register contact between the screen and the tip of the stylus 80. The stylus 80 can be of any material to make contact with the screen 105. The top face 100a also contains one or more dedicated and/or programmable buttons 75 for selecting information and causing the computer system to implement functions. The on/off button 95 is also shown.

Figure 2A also illustrates a handwriting recognition pad or "digitizer" containing two regions 106a and 106b. Region 106a is for the drawing of alphabetic characters therein for automatic recognition and region 106b is for the drawing of numeric characters therein for automatic recognition.

The stylus 80 is used for stroking a character within one of the regions 106a and 106b. The stroke information is then fed to an internal processor for automatic character recognition. Once characters are recognized, they are typically displayed on the screen 105 for verification and/or modification.

Figure 2B illustrates the bottom side 100b of one embodiment of the palmtop computer system of the present invention. An extendible antenna 85 is shown and also a battery storage compartment door 90 is shown. A communication interface 108 is also shown. In one embodiment of the present invention, the serial communication interface 108 is a serial communication port, but could also alternatively be of any of a number of well known communication standards and protocols, e.g., parallel, SCSI, Firewire (IEEE 1394), Ethernet, etc.

Figure 3 is an exploded view of the palmtop computer system 100 in accordance with one implementation. System 100 contains a front cover 210 having an outline of region 106 and holes 75a for receiving buttons 75b. A flat

panel display 105 (both liquid crystal display and touch screen) fits into front cover 210. Any of a number of display technologies can be used, e.g., LCD, FED, plasma, etc., for the flat panel display 105. A battery 215 provides electrical power. A contrast adjustment (potentiometer) 220 is also shown.

5

On/off button 95 is shown along with an infrared emitter and detector device 64. A flex circuit 230 is shown along with a PC board 225 containing electronics and logic (e.g., memory, communication bus, processor, etc.) for implementing computer system functionality. The digitizer pad is also included in
10 PC board 225. A midframe 235 is shown along with stylus 80. Position adjustable antenna 85 is shown. Antenna 85 is connected to an RF transmitter/receiver device 240 (transceiver) which is provides communications with wireless data network.

15 A radio receiver/transmitter device 240 is also shown between the midframe and the rear cover 245 of Figure 3. The receiver/transmitter device 240 is coupled to the antenna 85 and also coupled to communicate with the PC board 225. In one implementation, the Mobitex wireless communication system is used to provide two way communication between system 100 and other
20 networked computers and/or the Internet via a proxy server.

Figure 4 is a perspective illustration of one embodiment of the cradle 60 for receiving the palmtop computer system 100. Cradle 60 contains a mechanical and electrical interface 260 for interfacing with serial connection 108
25 (Figure 2B) of computer system 100 when system 100 is slid into the cradle 60 in an upright position. Once inserted, button 270 can be pressed to initiate two way communication between system 100 and other computer systems coupled to serial communication 265.

30 Figure 5 illustrates circuitry of computer system 100, some of which can be implemented on PC board 225. Computer system 100 includes an

10

25

30

SECRET

5
10

15

20

25

30

query is then submitted to the data center 320 through the wireless data network 310 in the form of a very small message (typically less than 50 bytes). The data center 320 serves as an interface to the Internet 52 which pulls the desired information from the Internet and returns a response via wireless data network 310 to the Palmtop Computer 100 in a response which is typically less than 500 bytes (compressed). As a result, the user is able to obtain the information desired from a particular Web page without having to actually browse the Internet and display Web pages on the limited resolution display of the Palmtop Computer 100. Web clipping is described in greater detail in U.S. patent application serial number 09/087,515 Filed May 29, 1998 entitled "Method and Apparatus for Communicating Information Over Low Bandwidth Communications Network", naming Hawkins et al. This application is hereby incorporated by reference.

15 This approach has the benefits of providing near instant access to the Internet while simultaneously providing low cost of service by controlling the airtime usage. This in turn results in long battery life since transmissions from Palmtop Computer 100 may be a substantial drain on batteries.

20 The Web clipping proxy server 324 is responsible for converting standard Internet protocols and content from a Web page into a form that is tuned for transmission across a wireless network and for display on a very thin client device such as Palmtop Computer 100. The Web clipping proxy server 324 uses standard Internet and security protocols (TCP, HTTP and SSL) to HTML servers 25 to insure compatibility. However, on the wireless side, it adjusts everything to support extremely low bandwidth and latency. Moreover, the Web clipping proxy server 324 compresses the data from the Internet to insure maximum transmission efficiency in the wireless environment. Data center 320 having Web clipping proxy server 324 is currently implemented for the commercially available 30 Palm VII wireless palmtop computer system as a service called Palm.net™ operated by Palm Computing, Inc.

0541378-033100

In accordance with the present intention, data center 320 also includes a software robot 330, which is able to receive and send HTML code. This robot 330 interfaces with a site map database 340 and a personal information database 350. Site map database 340 and personal information database 350 both also reside within data center 320. While not explicitly illustrated in Fig. 6, data center 320 is preferably a "secure" data center in that it is protected by fire wall and encryption technologies to assure the security of the information stored in the data center. For purposes of this document, the term "secure" is intended to embrace any security measures such as fire walls, encryption and authentication technologies as well as physical barriers (locked doors, etc.) to provide for security of the server and/or the data center.

In accordance with the present invention, the personal information database 350 is stored within a secure server in secure data center 320 so that the user of Palmtop Computer 100 can reliably store sensitive information in the personal information database 350. In general, it might be undesirable to store such confidential information within Palmtop Computer 100 due to the ease of loss of small hand held devices, or the possibility of theft of the device or the information stored therein. Accordingly, it is advantageous to provide a convenient way for the user to obtain access to this information in electronic form, for example for completing information used in on-line transactions or for otherwise providing responses without having to manually enter data on the Palmtop Computer 100, but in a manner which assures high levels of security.

25

Table 1 below shows a simplified example of the type of information which might be stored in a personal information database 350. Because of the nature of the use of this database, the database 350 may contain a very substantial amount of information which will be mapped to particular Web pages as will be described later. However, for purposes of illustration, only a brief amount of information is shown in Table 1 as illustrative of that which would appear in the

30

personal information database. In this case, the database includes fields such as "First Name", Last Name", "Email Address" and "Credit Card Number". In addition, variations of the data may appear in the personal information database. For example, it may also be advantageous to have a field which is the combination of the "First + Last Name" as shown in Table 1. Other example types of information which might be stored in the personal information database include age, shipping address, post office address, city, state, country, telephone number, fax number, marital status, sex, citizenship, political party, etc. An identification field ("Customer ID") is provided to uniquely identify each user associated with each Palmtop computer with personal information stored in the personal information database.

PERSONAL INFORMATION DATABASE	
FIELD	DATA
Customer ID	ASDFGHJKL-9876543210
First Name	William
Last Name	Smith
First + Last Name	William Smith
Email Address	ws@123.net
...	...
...	...
...	...
Credit Card Number	123456789

TABLE 1

Once the information is stored by the user in the personal information database 350, this information can be advantageously utilized to simplify the filling out of data forms and the like which a user often encounters in carrying out on-line transactions on the Internet. By way of example, and not by way of limitation, consider the fictitious example shown in Fig. 7. In this example, a Web clipping for a fictitious Web site shown as xyznews.com/orderfrm/ is shown. This Web clipping 370 may represent, for example, a Web clipping which permits a user to subscribe to a news service called xyznews. In order to complete the

subscription, the user must submit certain personal information to the Web site, which includes identifying information as well as payment information such as a credit card number. Four such pieces of information are shown in Fig. 7 for Web clipping 370 but of course this is not to be limiting since this is simply illustrative.

5

When a user decides that he or she wishes to subscribe to this service, the procedure would normally be to enter data into each of the frames 370A, 370B, 370C, 370D. The user would then submit this information and be registered to the subscription desired. In accordance with the present invention, the tedium associated with entry of this data is minimized by virtue of the user taking a control action to automate the process. The control action may be implemented, for example, by a pull-down menu or a specified sequence of strokes on the input device of the Palmtop Computer 100. In any event, a transmission occurs between the Palmtop Computer 100 and the data center 320 requesting that the data center 320 automatically populate the frames of the Web clipping.

15

When the data center 320 receives this request, robot 320 retrieves personal information from personal information database 350 in order to accomplish this task. Robot 320 also retrieves information from site map database 340 to determine exactly how to populate frames 370A through 370D of Web clipping 370.

20

In order to see how robot 330 accomplishes this task, it is instructive to consider sample HTML code which might be used to create Web clipping 370 as well as to view an example of the Site map database 340. Referring to Table 2, a sample of the HTML script which might be used to represent the Web clipping 370 as originally written for an Internet Web page is shown.

25


```
...
<HTML>
...
...
...
<FORM METHOD=post ACTION="/cgi-bin/custdata.pl">
<BR>First Name <INPUT TYPE="text" NAME="first" SIZE="15" MAXLENGTH="25"
<BR>Last Name <INPUT TYPE="text" NAME="last" SIZE="15" MAXLENGTH="25"
<BR>Email Address <INPUT TYPE="text" NAME="email" SIZE="15" MAXLENGTH="35"
...
...
<BR>Credit Card # <INPUT TYPE="text" NAME="cardnum" SIZE="15" MAXLENGTH="15"
</FORM>
...
</HTML>
```

TABLE 2

5

From this code, it can be determined that the information submitted upon completion of the frames of the Web clipping will ultimately be stored in a file entitled custdata.pl. It can also be determined that frame 370A representing the users first name uses the variable name "first". Similarly, the last name, E-mail address and credit card number frames 370B, 370C and 370D use variable names "last", "email" and "cardnum", respectively.

10

Referring now to Table 3, an illustration of the Site map database is shown. Site map database 340 is a database, which maps the fields of the personal information database to data entry frames in various Web clippings (representing Web sites). In the simplified example shown in Table 3, for example, two data mappings are illustrated. For xyznews, the personal information database field named "First Name" is mapped to a field named "first" in the site map database. Similarly, personal information field "Last Name" is mapped to "last" in the site map database, "Email Address" is mapped to "email" and "Credit Card Number" is mapped to "cardnum".

15

20

Other types of information may also be mapped in the site map database for each of numerous Web clippings. For example, the second illustration for a type of survey data may request age and birth date information from the personal information database which is mapped to fields called "age" and "dateofbirth" in

- 5 the survey data. Thus, when Palmtop Computer 100 submits a request to populate the frames of a Web clipping such as 370, robot 330 correlates the data fields of the Web clipping 370 with data fields in the personal information database and returns the data to populate fields 370A, 370B, 370C through 370D in frame 370. The user may then submit the data by tapping the submit icon 372
- 10 for example to complete the on-line transaction.

SITE MAP DATABASE		
PIDB Field	XYZNEWS.COM/ORDERFRM/	XXXX.COM/SURVEYDATA/
First Name	first	
Last Name	last	
First + Last Name		surveyed_name
...
Email Address	email	emailaddress
...
Age		age
Birth Date		dateofbirth
...
Credit Card Number	cardnum	

TABLE 3

15 Those skilled in the art will appreciate that authentication functions and encryption functions should also be incorporated in the various transmissions associated with the present invention in order to maintain the security of personal information.

20 Referring now to Fig. 8, the process previously described is summarized in the form of a flow chart. At 400 the Palmtop Computer 100 presents a Web clipping containing frames which are to be filled to complete a transaction. At

404, the user can instruct the Palmtop Computer 100 to implement a process of populating the frames. If no such instruction is given or if the user takes other action the process stops at 408. If, at 404, the Palmtop Computer 100 is instructed to populate the frames, control passes to 412 where the Palmtop

5 Computer 100 transmits a request to the data center 320 to assist in populating the frames. In general, such a request may include a user identification (e.g. user ID and password) used for authentication in the authentication server 322 as well as an Internet address for the page to be populated. If the data center's authentication server fails to authenticate the user at 416, the process again
10 stops at 408. If the user is authenticated at 416, robot program 330 identifies the Web clipping frames from the site map database and pulls personal information from the personal information database which is needed to populate those Web clipping frames at 420. Data center 320 then transmits the personal information back to the Palmtop Computer 100 at 424 in encrypted or enciphered form.

15

At 430, Palmtop Computer 100 receives the transmission and populates the Web clipping frames with the personal information transmitted from the data center 320. At 434, the user has the option of completing the transaction or aborting. If the user chooses to abort control passes again to 408 which
20 terminates the process. If, however, the user chooses to complete the transaction at 434, Palmtop Computer 100 transmits the populated frame to complete the transaction at 438. Again, since the transmission includes sensitive personal information, the transmission should be enciphered or encrypted to protect the security of the information. Once this transmission has occurred, the
25 data center sends the information along to the Internet Web page to complete the transaction.

Those skilled in the art will recognize that various protocols can be used to utilized to effect the above transmissions. Moreover, there are many possible
30 implementation details which have not been described herein but would be within the skill of those of ordinary skill in the art. For example, while the invention has

5 Palmtop Computer 100 to know which Web clipping and Web page this data correlates to. Also, in a slight variation of the present invention, when the user requests that the data center provide information to populate a Web page, the data center may simply populate the page and forward it to the appropriate address on the Internet without further interaction of the Palmtop Computer 100.

15

20

While the invention has been described in conjunction with specific embodiments, it is evident that many alternatives, modifications, permutations and variations will become apparent to those skilled in the art in light of the foregoing description. Accordingly, it is intended that the present invention embrace all such alternatives, modifications and variations as fall within the scope of the appended claims.